Listing of Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

WHAT IS CLAIMED IS:

1. – 36. (Cancelled)

37. (Previously Presented) A method of controlling a queue buffer in a data unit transmission device, the queue buffer being arranged to queue data units in a queue and being connected to a link, the method comprising the steps of:

determining a value (QL; QLav) of a length parameter related to the length of the queue;

comparing the value (QL; QLav) with a length threshold value (Lth);

performing a congestion notification procedure with respect to one or more data units from the queue if the value (QL; QLav) is greater than the length threshold value (Lth);

estimating, by an automatic threshold adaptation procedure, a link capacity value (LC) based on the data rate (DR) of the link and adapting the threshold value (Lth) on the basis of the estimated link capacity value (LC), wherein the automatic threshold adaptation procedure is operable in one of at least a first and a second adaptation mode, the first adaptation mode being associated with minimizing queuing delay and adapting the threshold value (Lth) on the basis of n*LC, where LC represents the estimated link capacity value and n>=1, and the second adaptation mode being associated with maximizing utilization and adapting the threshold value (Lth) on the basis of m*LC, where m > 1 and m > n.

38. (Previously Presented) The method of claim 37, wherein the queue buffer is arranged for receiving data units from a sender that performs window-based flow control and divides its send window by k, k > 1, when receiving a congestion notification or when detecting data unit loss, wherein n=k-1 and m = k^2 - 1.

39. (Previously Presented) The method of claim 38, wherein k=2, n=1 and m=3.

40. (Currently Amended) The method of claim 38, further comprising the step of setting the first adaptation mode or the second adaptation mode manually by an operator.

41. (Currently Amended) The method of claim 38, further comprising the step of automatically setting the first adaptation mode or the second adaptation mode using an automatic mode setting procedure.

42. (Previously Presented) The method of claim 38, further comprising detecting potential data unit losses outside of the data unit transmission device in a flow queued in the queue buffer using a loss indication event detection procedure.

43. (Previously Presented) The method of claim 42, further comprising the step of monitoring sequence identifiers of data units in the queued flow during the loss indication event detection procedure.

44. (Previously Presented) The method of claim 42, further comprising the step of monitoring loss indication information in acknowledgement data units sent from a receiver of the queued flow to the sender of the queued flow during the loss indication event detection procedure.

45. (Currently Amended) The method of 42, further comprising the steps of:

counting a number of data unit loss indication events occurring outside of the data unit transmission device in the queued flow using a counting procedure; and

deriving a characteristic count value from the counted numbers in a procedure.

46. (Previously Presented) The method of claim 45, wherein the procedure for deriving a characteristic count value determines the number of loss indication events occurring outside of the data unit transmission device in the queued flow in each of p respective predetermined intervals, p being a natural number, and selects a maximum among the numbers as the characteristic count value.

47. (Previously Presented) The method of claim 46, wherein the predetermined intervals are defined as the time between two consecutive decisions of performing a congestion notification for a data unit in the queued flow.

48. (Previously Presented) The method of claim 45, wherein the procedure for deriving a characteristic count value determines an average number of loss indication events occurring outside of the data unit transmission device in the queued flow as the characteristic count value.

49. (Currently Amended) The method of claim 45, further comprising the step of ~~the automatic mode setting procedure~~ accounting for an outcome of the loss indication event detection procedure by the automatic threshold adaptation procedure.

50. (Previously Presented) The method of claim 49, further comprising the step of the automatic threshold adaptation procedure accounting for an outcome of the loss indication event detection procedure when dynamically adapting the threshold value (Lth) in the first or the second adaptation mode.

51. (Previously Presented) The method of claim 50, further comprising the congestion notification procedure deciding, in a decision step, whether to perform a congestion notification procedure with respect to one or more data units, which decision step depends on the outcome of the loss indication event detection procedure.

52. (Previously Presented) The method of claim 51, further comprising the step of monitoring whether an event that indicates a potential data unit loss in a queued flow occurs within a predetermined period of time (GT) after it is detected that the value of the length parameter (QL, QLav) related to the length of the queue is greater than the length threshold value (Lth), and the decision step comprises not performing a congestion notification if an event indicating a potential data unit loss occurs within the predetermined period of time (GT), and otherwise performing the congestion notification.

53. (Previously Presented) The method of claim 52, wherein the queue buffer is arranged to hold at least a first queue and a second queue, the automatic threshold adaptation procedure adapting a first threshold value (Lth_1) associated with the first queue in accordance with the first adaptation mode and adapting a second threshold value(Lth_2) associated with the second queue in accordance with the second adaptation mode.

54. (Previously Presented) The method of claim 52, further comprising the steps of:

discriminating data units to be queued on the basis of their contents in a discrimination and placing procedure; and

placing data units into the first or the second queue in dependence on a discrimination result.

55. (Previously Presented) A queue buffer controller for controlling a queue buffer in a data unit transmission device, the queue buffer being arranged to queue data units in a queue and being connected to a link, comprising:

a queue length determinator for determining a value of a length parameter (QL, QLav) related to the length of the queue, a comparator for comparing the value with a length threshold value (Lth);

a congestion notifier for performing a congestion notification procedure if the value is greater than the length threshold value; and

a threshold adaptor for automatically adapting the length threshold value (Lth) by estimating a link capacity value (LC) based on the data rate (DR) of the link and adapting the length threshold value (Lth) on the basis of the estimated link capacity value, wherein the threshold adaptor is operable in one of at least a first and a second adaptation mode, the first adaptation mode being associated with minimizing queuing delay and adapting the threshold value (Lth) on the basis of n*LC, where LC represents the estimated link capacity value and n>=1, and the second adaptation mode being associated with maximizing utilization and adapting the threshold value (Lth) on the basis of m*LC, where m > 1 and m > n.

56. (Previously Presented) The queue buffer controller of claim 55, the queue buffer being arranged for receiving data units from a sender that performs window-based flow control and divides its send window by k, k > 1, when receiving a congestion notification or when detecting data unit loss, the threshold adaptor being arranged such that n=k-1 and m=k^2 - 1.

57. (Previously Presented) The queue buffer controller of claim 56, wherein k = 2, n = 1 and m = 3.

58. (Currently Amended) The queue buffer controller of claim 55, further comprising a setting mechanism for the manual setting of the first adaptation mode or the second adaptation mode by an operator.

59. (Currently Amended) The queue buffer controller of claim 55, further comprising an automatic mode setting mechanism for setting the first adaptation mode or the second adaptation mode automatically.

60. (Previously Presented) The queue buffer controller of claim 55, further comprising a loss indication event detector for detecting potential data unit losses outside of the data unit transmission device in a flow queued in the queue buffer.

61. (Previously Presented) The queue buffer controller of claim 60, wherein the loss indication event detector comprises a monitor for monitoring sequence identifiers of data units in the queued flow.

62. (Previously Presented) The queue buffer controller of claim 60, wherein the loss indication event detector comprises a monitor for monitoring loss indication information in acknowledgement data units sent from a receiver of the queued flow to the sender of the queued flow.

63. (Previously Presented) The queue buffer controller of claim 60, comprising a counter for counting a number of data unit loss indication events occurring outside of the data unit transmission device in the queued flow, and a count number processor for deriving a characteristic count value from the counted numbers.

64. (Previously Presented) The queue buffer controller of claim 63, wherein the count number processor is arranged for determining the number of loss indication events occurring outside of the data unit transmission device in the queued flow in each of p respective predetermined intervals, p being a natural number, and selecting a maximum among the numbers as the characteristic count value.

65. (Previously Presented) The queue buffer controller of claim 64, wherein the predetermined intervals are defined as the time between two consecutive decisions of performing a congestion notification for a data unit in the queued flow.

66. (Previously Presented) The queue buffer controller of claim 63, wherein the count number processor is arranged for determining an average number of loss

indication events occurring outside of the data unit transmission device in the queued flow as the characteristic count value.

67. (Currently Amended) The queue buffer controller of claim 60, wherein the ~~automatic mode setting mechanism~~ threshold adaptor for automatically adapting the length threshold value is arranged for taking an output of the loss indication event detector into account.

68. (Previously Presented) The queue buffer controller of claim 60, wherein the threshold adaptor is arranged for taking an output of the loss indication event detection procedure into account for dynamically adapting the threshold value (Lth) in the first or the second adaptation mode.

69. (Previously Presented) The queue buffer controller of claim 60, wherein the congestion notifier comprises a decision unit for deciding whether to perform a congestion notification with respect to one or more data units, which decision unit is arranged for taking into account an output of the loss indication event detector.

70. (Previously Presented) The queue buffer controller of claim 69, wherein the loss indication event detector is arranged for monitoring whether an event that indicates a potential data unit loss in a queued flow occurs within a predetermined period of time (GT) after it is detected that the value of the length parameter (QL, QLav) related to the length of the queue is greater than the length threshold value (Lth), and the decision unit is arranged to not perform a congestion notification if an event indicating a potential data unit loss occurs within the predetermined period of time (GT), and to otherwise perform the congestion notification.

71. (Previously Presented) The queue buffer controller of claim 55, wherein the queue buffer is arranged to hold at least a first queue and a second queue, the threshold adaptor is arranged for adapting a first threshold value(Lth_1) associated with

the first queue in accordance with the first adaptation mode and adapting a second threshold value (Lth_2) associated with the second queue in accordance with the second adaptation mode.

72. (Previously Presented) The queue buffer controller of claim 71, further comprising a discrimination and placing unit for discriminating data units to be queued on the basis of their contents and placing data units into the first or the second queue in dependence on a discrimination result.